



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/718,483	11/24/2000	Toshio Hasegawa	200089US3	3527

22850 7590 04/08/2003

OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.  
FOURTH FLOOR  
1755 JEFFERSON DAVIS HIGHWAY  
ARLINGTON, VA 22202

EXAMINER

VANOY, TIMOTHY C

ART UNIT	PAPER NUMBER
----------	--------------

1754

DATE MAILED: 04/08/2003

13

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/718,483

Applicant(s)

HASEGAWA et al.

Examiner

VANDY

Group Art Unit

1754

— The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address —

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE THREE MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- ☒ Responsive to communication(s) filed on Jan 27, 2003
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- ☒ Claim(s) 26-43 is/are pending in the application.
- Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- ☒ Claim(s) 26-33 AND 43 is/are allowed.
- ☒ Claim(s) 34-38 is/are rejected.
- ☒ Claim(s) 34-42 AND 44 is/are objected to.
- ☐ Claim(s) \_\_\_\_\_ are subject to restriction or election requirement

## Application Papers

- ☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119 (a)-(d)

- ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).
- ☒ All ☐ Some\* ☐ None of the:
- ☒ Certified copies of the priority documents have been received.
- ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
- ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

\*Certified copies not received: \_\_\_\_\_

## Attachment(s)

- ☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). \_\_\_\_\_ ☐ Interview Summary, PTO-413
- ☐ Notice of Reference(s) Cited, PTO-892 ☐ Notice of Informal Patent Application, PTO-152
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948 ☐ Other \_\_\_\_\_

Office Action Summary

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission date-stamped Jan. 27, 2003 (paper no. 11) has been entered.

### ***Claim Objections***

Claims 34-42 and 44 are objected to for containing grammatical informalities, inconsistencies and phrases that are less than clear. The following proposed amendments would overcome these objections as well as improve the clarity and quality of the claim language.

a) In claim 34 lns. 1 and 2, "by using a trap mechanism which is" should be inserted between "gas" and "discharged" in line 1 and "by using a trap mechanism" should be deleted from line 2 to resolve the question of whether or not the trap mechanism is used to process the objects or to remove the impurity gas.

A similar amendment is proposed for claim 39.

b) In claims 34 and 39 line 3, "insides" should be replaced with "the interior". In claim 34 line 3, "and the trap mechanism" should be replaced with ", thereby drawing

Art Unit: 1754

the impurity gas through an exhaust pipe connecting the process apparatus and the trap mechanism". In claim 34 line 4, "by an" should be replaced with "within the". In claim 34 line 4, "connecting" should be replaced with "at a location between". In claim 34 line 5, "to" (1<sup>st</sup> occurrence) should be replaced with "and".

By making these amendments, antecedent basis can be provided in the previous "evacuating" step for the mixing of the reaction gas with the impurity gas in the "mixing" step, and the claim language and can particularly point out where in the reaction gas is mixed with the impurity gas.

c) There is no antecedent basis in claim 34 for the "process gas" mentioned in claims 37 and 38. It appears that "process gas" in claims 37 and 38 should be replaced with "impurity gas".

d) In claims 35-38, there is no need to insert the hyphen between "impurity" and "gas".

e) In claim 39 line 4, "solidified gas" should be replaced with "solidified impurities" (and, concomitantly, "is" should be replaced with "are"). "Solidified gas" is an oxymoron.

f) In claim 39 line 6, "causing" should be replaced with "contacting". In claim 39 line 6, "to contact" should be replaced with "with". In claim 39 line 6, "impurity gas" should be replaced with "solidified impurities". In claim 39 lines 7 and 8, "impurity gas, thereby stabilizing the impurity gas trap mechanism to oxidize the impurity gas, thereby stabilizing the impurity gas" should be replaced with "solidified impurities".

In claim 39, it is not the "impurity gas" that is contacted with the "oxidative gas". In claim 39, it would seem that neither the "trap mechanism" or the "impurity gas" are "stabilized" by the "oxidative gas" as set forth in the present claim language.

g) In claim 40 line 2, "reaction by-product" should be replaced with "solidified impurities" to be consistent with the previously suggested claim language.

h) In claim 40 line 5, "oxidation" should be replaced with "oxidative", consistent with the previous claim language.

i) The second line of claim 41 should be deleted in its entirety. In the 3<sup>rd</sup> line of claim 41, "is contacted" should be inserted between "gas" and "at". In the 4<sup>th</sup> line of claim 41, "then exhausting said trapped oxidative gas plural times" should be replaced with "the contacting and evacuating of the oxidative gas is repeated a plurality of times".

In claim 41, it would seem that nothing is being "stabilized" with the "oxidative gas". There is no need to repeat the "plural times" limitation at the end of the claim.

j) In claim 42 line 2, "reaction by-product" should be replaced with "impurity gas". In claim 42 lines 2 and 3, "a by-product of a film deposition gas" should be replaced with "a chemical deposited on the inner wall of the process chamber".

According to pg. 5, 1<sup>st</sup> paragraph in the applicants' specification, the "cleaning gas" reacts with the impurities deposited on the interior walls of the processing chamber.

k) In claim 44 line 2, "is at least one of" should be replaced with "comprises".

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 35 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicants regard as their invention.

a) It is not clear what is intended in claim 35. If the reaction gas is the same as the process gas, then the reaction by-products of claim 34 will not be produced. Claim 35 raises the question of *which* gas contained in the process gas is the same as the reaction gas.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 34 is rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Pat. 5,788,747.

Fig. 1 and the discussion of fig. 1 set forth in col. 2 lns. 64 et seq. in U. S. Pat. 5,788,747 illustrates and describes at least an obvious variation of the same method for removing dimethylaluminum hydride (DMAH) out of the exhaust gas emitted from chemical vapor deposition (CVD) chamber, comprising:

Art Unit: 1754

(evidently) evacuating the DMAH-contaminated exhaust gas from the CVD chamber and also the “deleterious material removing means” (40) in as much as fig. 1 shows the exhaust gas being extracted from the CVD chamber through the “dry pump”, “deleterious material removing means” and “water scrubber” en route to being discharged (evidently) to the atmosphere, and

mixing “dry air” (corresponding the “reaction gas” set forth in at least applicants’ claim 34) with what appears to be the DMAH-contaminated exhaust gas in the “deleterious material removing means” (40) so that the air combusts the DMAH into combustion products (corresponding to the “reaction by-products having a lower vapor pressure than that of the impurities” set forth in applicants’ claim 34) that fall to the bottom of the “deleterious material removal means” (40) (corresponding to the step of condensing and solidifying the reaction by-products so that the trap traps the solidified reaction by-products, as set forth in applicants’ claim 34).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

Art Unit: 1754

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

The person having "ordinary skill in the art" has the capability of understanding the scientific and engineering principles applicable to the claimed invention. The references of record in this application reasonably reflect this level of skill.

~~This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).~~

Claims 34-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Pat. 5,788,747.

Fig. 1 and the discussion of fig. 1 set forth in col. 2 lns. 64 et seq. in U. S. Pat. 5,788,747 illustrates and describes at least an obvious variation of the same method for removing dimethylaluminum hydride (DMAH) out of the exhaust gas emitted from chemical vapor deposition (CVD) chamber, comprising:

(evidently) evacuating the DMAH-contaminated exhaust gas from the CVD chamber and also the "deleterious material removing means" (40) in as much as fig. 1



Art Unit: 1754

shows the exhaust gas being extracted from the CVD chamber through the “dry pump”, “deleterious material removing means” and “water scrubber” en route to being discharged (evidently) to the atmosphere, and

mixing “dry air” (corresponding the “reaction gas” set forth in at least applicants’ claim 34) with what appears to be the DMAH-contaminated exhaust gas in the “deleterious material removing means” (40) so that the air combusts the DMAH into combustion products (corresponding to the “reaction by-products having a lower vapor pressure than that of the impurities” set forth in applicants’ claim 34) that fall to the bottom of the “deleterious material removal means” (40) (corresponding to the step of condensing and solidifying the reaction by-products so that the trap traps the solidified reaction by-products, as set forth in applicants’ claim 34).

The difference between the applicants’ claims and U. S. pat. 5,788,747 is that applicants’ claims 35, 37 and 38 sets forth that the reaction gas is the same as a gas contained in the process gas (claim 35); the process gas includes  $\text{TiCl}_4$  and the reaction gas includes  $\text{NH}_3$  (claim 37) and the process gas includes  $\text{WF}_5$  and the reaction gas includes  $\text{NH}_3$  (claim 38).

The process of U. S. Pat. 5,788,747 is generic to semiconductor manufacture (please see col. 2 ln. 67 in U. S. Pat. 5,788,747, for example).

U. S. Pat. 5,904,757 is also generic to semiconductors (please see col. 1 Ins. 10 and 11 in U. S. Pat. 5,904,757, for example), but specific for the production of TiN semiconductors via the reaction between  $\text{TiCl}_4$  and  $\text{NH}_3$  (please also see col. 3 Ins. 10-17 in U. S. Pat. 5,904,757).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made *to modify* the process of U. S. Pat. 5,788,747 *by substituting* the  $\text{TiCl}_4$  and  $\text{NH}_3$  reagents disclosed in col. 3 Ins. 10-17 in U. S. Pat. 5,904,757 *in lieu of* the DMAH mentioned in col. 1 Ins. 27-30 in U. S. Pat. 5,788,747, in a manner rendering obvious the limitations of applicants' claims 35, 37 and 38, *because* it is submitted to be *prima facie* obvious to modify the prior art method for making aluminum-based semiconductors set forth in col. 1 Ins. 27-30 in U. S. Pat. 5,788,747 to make any other semiconductors known to be made by the same CVD process alluded to in col. 1 In. 23 in U. S. Pat. 5,788,747, such as the TiN semiconductors embraced in the scope of applicants' claim 37 and also in col. 3 Ins. 10-17 in U. S. Pat. 5,904,757 - as well as *any* other CVD-based semiconductor, such as those embraced in the scope of applicants' claims 35 and 38.

The limitations of applicants' claim 36 are noted, but it is submitted to be *prima facie* obvious to add a stoichiometric surplus of reaction gas to the impurity gas, in the manner set forth in applicants' claim 36, only to achieve the expected advantage of ensuring maximum conversion of the impurity gas into reaction by-product.

Claims 26-33 have not been rejected under either 35USC102 or 35USC103 because U. S. Pat. 5,788,747 is directed to the deposition of aluminum on a semiconductor wafer by using dimethylaluminum hydride (i. e. DMHA) (please see col. 2 In. 66 to col. 3 In. 6 in U. S. Pat. 5,788,747, for example), which is not among the processes listed in the 1<sup>st</sup> full paragraph set forth in claim 26. Further, U. S. Pat.

Art Unit: 1754

5,788,747 does not teach or suggest a method for treating an exhaust gas containing  $\text{TiCl}_4(\text{NH}_3)_n$  and  $\text{TiF}_4(\text{NH}_3)_n$ , as set forth in applicants' claim 31.

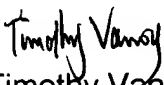
Claim 39 and claims dependent thereon have not been rejected under either 35USC102 or 35USC103 because U. S. Pat. 5,788,747 does not teach or suggest that the "deleterious material removing means" (40) condenses and solidifies the impurities in the exhaust gas, in the manner that the claim 39 requires the "trap mechanism" to condense and solidify the impurities.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy C. Vanoy whose telephone number is 703-308-2540. The examiner can normally be reached on 8 hr. days.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman, can be reached on 703-308-3837. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Timothy Vanoy/tv  
April 3, 2003

  
Timothy Vanoy  
Patent Examiner  
Art Unit 1754